

BioNetsTM Containing Solid Oxygen Source, Isolite[®], and Bacterial Strain PM1 Stimulate *in situ* Bioremediation of MTBE and BTEX in Soil and Groundwater

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Collaboration with the ORD, Region 8, Foremost Solutions, University of California, and the Confederated Salish and Kootenai Tribes, led to the development and demonstration of this *in situ* treatment technology. BioNetsTM were developed, initiated, studied, and used to successfully remediate methyl-tertiary butyl ether- (MTBE) and benzene, toluene, ethylbenzene, and xylene (BTEX)-contaminated soil and groundwater. BioNetsTM (each with three vertically stacked hydraulic fractures), placed in the subsurface at a site in Montana, contained (1) oxygen as solid oxygen source (SOS) or air, (2) fracture material as Isolite[®] or sand, (3) bacterial strain PM1 (aerobic MTBE-degrading bacteria, monitored with a genetic probe), and (4) nutrients. After 22 months of treatment, the reductions of MTBE in groundwater samples were as high as 85 percent and of BTEX as high as 99.7 percent, where optimum conditions existed for biodegradation. Optimum conditions included the use of Isolite[®] inoculated with bacterial strain PM1 and SOS. The study showed that the use of SOS stimulates more contaminant reduction than supplied air. After 12 months, DNA of PM1 was consistently found in the subsurface associated with the fractures.